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HUMAN RESOURCE ACCOUNTING: ITS APPLICATION IN HUMAN RESOURCE MANAGEMENT

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THESIS

HUMAN RESOURCE ACCOUNTING: ITS APPLICATION IN HUMAN RESOURCE MANAGEMENT

BY

Bruce Anthony Joseph Puccini

June 1978

Thesis Advisor: R. A. McGonigal

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The concept of Human Resource Accounting was developed to give management an accurate estimation of the value of people to the organization. This is of major concern to the Department of Defense today. In this thesis, an alternative to the traditional methods of accounting for human worth has been proposed. The Expected Realizable Value Theory as developed by Eric Flamholtz has been used to assess the worth of the individual to several military organizations. This model was also used to provide a

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cost-benefit analysis regarding: (1) the Navy's current up or out policy, (2) personnel costs relating to new construction cost overruns, (3) adjusting personnel costs in regard to the fluctuating productivity of a command, and (4) the evaluation of detailing and assignment procedures. In the Flamholtz model, the expected realizable value is comprised of two variables: (1) the probability that a person will remain with the organization during his expected service life, and (2) a person's conditional value, which is a multi-dimensional variable comprised of three factors: promotability, transferability, and productivity. By adjusting this model to account for other factors, an alternative to current detailing and assignment procedures was evaluated. Further research drawing upon several disciplines including, but not limited to, accounting, economics, behavioral science, and management science might help provide a workable theory of human resource value that could be designed to meet a variety of needs within the Department of Defense.

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Human Resource Accounting: Its Application in Human Resource Management

by

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Lieutenant, United States Navy
B.S., Eastern Washington State College, 1971

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

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June 1978

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The concept of Human Resource Accounting was developed to give management an accurate estimation of the value of people to the organization. This is of major concern to the Department of Defense today. In this thesis, an alternative to the traditional methods of accounting for human worth has been proposed. The Expected Realizable Value Theory as developed by Eric Flamholtz has been used to assess the worth of the individual to several military organizations. This model was also used to provide a cost-benefit analysis regarding: (1) the Navy's current up or out policy, (2) personnel costs relating to new construction cost overruns, (3) adjusting personnel costs in regard to the fluctuating productivity of a command, and (4) the evaluation of detailing and assignment procedures. In the Flamholtz model, the expected realizable value is comprised of two variables: (1) the probability that a person will remain with the organization during his expected service life, and (2) a person's conditional value, which is a multi-dimensional variable comprised of three factors: promotability, transferability, and productivity. By adjusting this model to account for other factors, an alternative to current detailing and assignment procedures was evaluated. Further research drawing upon several disciplines including, but not limited to, accounting, economics, behavioral science, and

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This thesis is dedicated to CDR Richard A. McGonigal. Without his patience, help, and devotion, it never would have been written.

I. ACCOUNTING FOR HUMAN CAPITAL

A. NATURE OF THE PROBLEM

The management of the Department of the Navy is certainly an awesome undertaking. The enormous assets of ships, bases, aircraft, airfields, equipment and land are difficult for the layman to summarize. It is apparently even more difficult for the layman to account in any meaningful way for the total worth of the human assets--military and civilian--in the naval establishment.

The management of such a large enterprise inevitably involves struggles with outside agencies and internal groups for program assets. Budget hearings, P. O. M. submissions and day-to-day allocations of resources are more easily quantified when the subject is material. Perhaps because of the suspected but undefined hidden costs of human assets, the usual practice is to assess personnel items in the liability column of the balance sheet in the rubric of salaries, benefits and retirement costs.

It is little wonder, then, that managers find it much easier to quantify material working capital and hope that their policies and resource decisions will cover the more vague and less-easy-to-quantify human assets. In a battle to trim budgets, for example, the material portion of an

electronics subsystem is much easier to inventory than the selection, training and support of its personnel associated with the subsystem.

Quality control of material is more lucid than quality control of human performance. Computing dollars lost due to inoperable parts is easier than ascertaining the amount of investment lost in a poor recruiting program or a management development seminar.

Senior managers may be called upon to choose between keeping a third echelon repair facility in operation or continuing a medical dispensary. Until recently there has been no reliable device for measuring the impact of that decision. On the one hand we have exact pricing and fair value in the market estimates. On the other side we have anecdotal evidence and subjective impressions.

From the initiation of the Human Resource Management Project in 1972 until the present there has been a constant need to defend the need of the "people programs." Is an Alcohol Rehabilitation Center cost effective? Was Phase I of the Navy's Equal Opportunity Program worth its massive effort? Often the answers to these questions were subjective and based solely upon whether the receivers of these programs liked them or thought them to be worthwhile.

Human Resource Management must deal with more than social action problems. It must--if it is to enhance combat readiness--impact throughout the warp and woof of the operating fleet and its supporting units.

Consider wage determination--one of the most significant aspects of personnel management. It has a profound effect upon the recruitment, retention satisfaction and motivation of the employees and on the very survival of the organization [French 1974]. The costs of screening, hiring, training personnel and building them into an efficiently functioning organization are not reflected in the ordinary salary table. Likert [1961] found that many firms simply ignore these costs. An orderly and inclusive system for valuing these assets has been missing.

The technology of human resource accounting is being developed to provide such a system. The goals are to define human resource value and to predict future human resource value to the organization.

To illustrate applications of this technology five examples are cited, each of which deals with a basic management dimension--return on investment (ROI).

1. Program Justification

Stockholders are not alone in wanting to know the return on their investment. Program sponsors demand some evidence for justifying their continued support of a program. In the case of many Navy programs there is very little precision in even estimating the investment. Centering upon this aspect of estimating human investment this example focuses upon the investment side of one such activity, the Navy's Aviation Safety Program at Monterey, California.

2. Evaluation of Promotion Policies

In this area an application is proposed for using human resource accounting in assessing the Navy's "up or out" promotion policy.

3. Prediction of Human Asset Costs Associated With New Construction Overruns

Alarming as it may be to the conscientious project director, the real costs incurred by a construction overrun may be only partially accounted for in material costs. Human resource accounting is used to estimate savings that could result from assigning personnel to troubleshoot a project.

4. Estimation of Personnel Costs Associated With Adjusting Missions of a Navy Organization

A productivity model is applied to a tropical storm tracking unit where advances in technology alter the unit's productivity.

5. Evaluation of Detailing and Assignment Procedures

Human resource accounting is applied to the detailing and assignment procedures used for the exchange program (sending a pilot to the Royal Navy Staff College). Again, the return on investment is the center of our concern.

The most frequently used model in these examples is the Stochastic Rewards Valuation Model, developed by

Eric Flamholtz. In this model the key element is the estimation of a person's expected realizable value in comparison to his potential realizable value.

B. THE NEED FOR HUMAN RESOURCE ACCOUNTING

It will be seen that the inability of an organization to accurately account for its human resources has more effect than simply its publishing of an incomplete statement of its assets and liabilities. The absence of human resource accounting affects the manner in which managers regard their human resources and influences the very nature of organizational climate [Flamholtz, 1971]. It is felt by authorities such as Caplan [1971] that human-asset accounting will represent one of the major innovations in accounting and control during the next decade.

1. Acquisition and Development

The current state of the art of personnel selection and acquisition emphasizes testing and screening procedures which focus upon an individual's present abilities. In assessing that individual's present worth there is seldom a full statement of that person's actual dollar worth to the organization. There is hardly any attempt to project future actual worth to the organization.

A recruiter, for example, can not presently say prospect "A" is worth $95,000 to the Navy today while prospect "B" is worth $150,000. Nor can the recruiter

predict which will be worth $200,000 after four years of training and fleet experience. In recruiting one would certainly hope to more accurately predict future value to the organization [Flamholtz, 1974].

Similarly, in the field of human resource development one is hard pressed to assess the training costs and payoffs of the trainee this moment, to say nothing of predicting the actual increased value of the trainee to the organization in the future. Presumably this would not be a straightline appreciation. However, managers are hard pressed to even roughly predict the effect of development upon the value of trainees over time. One is left with the tenuous stance of designing training packages which "seem" to be enough to elevate trainees to a "satisfactory" level of performance.

2. Evaluation

In the fast developing technology of personnel evaluation little attention has been paid to the use of monetary methods.

At present there is considerable attention being paid to evaluating:

a. level of intelligence and aptitudes
b. level of training
c. performance levels
d. degree of motivation

e. quality of leadership

f. innovativeness

g. communication skills

h. decision making abilities

i. ability to integrate and coordinate

j. ability to apply past experience to present problems.

The continuing problem with each of these foci is the subjectivity of the evaluation process. The inclusion of economic measures is seen as at least one attempt to bring more objectivity to the ranking of one employee above another [Likert, 1967]. Flamholtz [1974] points out that those reward systems such as bonuses might also be administered much more fairly and efficiently if human resource accounting was employed in their computation.

It takes no great imagination to project that still another possible use of human resource accounting would be in the assessment of the very system of personnel evaluation. If we really knew what the present evaluation system cost in terms of time spent administering it, anxiety incurred in its use, we might well decide that it should be discontinued, replaced by random number generators or, at the very least, modified to better reflect the organization's need to know the value of its employees' performance.

C. THE CONCEPT OF HUMAN RESOURCE ACCOUNTING

It seems unfortunate that in recent years while there has been a flurry of interest in the valuation of human resources in the accounting literature and that there has been substantial attention to manpower and staffing problems in the management and planning science journals there has been little integration of the research efforts of these separate disciplines [Gillespie, Leininger, and Kahalas, 1976].

The concept of human resource accounting seeks to bridge this gap. Those firms employing it seem to do so (at present) only when acquiring new firms or in buying franchises which are sold (with great interest for the Internal Revenue Service) but not yet in the day-to-day activities such as recruiting, drafting or trading of individuals.

At best, for many firms, human resource accounting amounts to valuing its individual members on the basis of recruiting costs, training and development costs with some attention to depreciation and life expectancy with the firm [Hopwood, 1976].

The concept of human resource accounting is that human expected realizable value can be assessed using traditional accounting methods and that its relation to human potential realizable value can be displayed for managerial consideration.

Likert [1967] pointed out that in many firms, the human assets are far more valuable and marketable than its

physical assets. Yet, ironically, we will go to exquisite lengths to compute the present value of a truck and ignore the realizable value of its driver.

D. IMPLEMENTING A HUMAN RESOURCE ACCOUNTING SYSTEM

There are three principal steps in implementing a human resource accounting system: (1) definition of objectives, (2) development of a data base with accounting measurements, and (3) actual employment of the system in the organization at all levels of management [Flamholtz, 1974].

1. Definition of Objectives

The objectives of the system should be an outgrowth of managements requirements for human resource information. To identify management's human resource accounting requirements, the human resource management process must be studied and analyzed. The major functions of the organization must be identified, and the information required to fulfill these functions must be specified as precisely as possible. Each organizational unit responsible for human resource management should define its functions, indicate the kinds of decisions made, their relative frequency, and the kinds of information needed to make the decisions. Information needs must be analyzed in relation to present information flows, and new information to be gathered must be specified [Flamholtz, 1974]. Based on this analysis of management's requirements, the proper human resource accounting system can be tailored to meet specific organizational objectives.

2. Development of a Data Base With Accounting Measurements

Obviously, the accounting measurements must relate directly to the real world objectives of the system. Data collection is usually expensive. Managers may also suffer from communication overload. Quantity and quality of data are difficult to specify. The costs of getting highly valid and reliable data may in some cases outweigh any savings gained in certain management decisions. Often, however, an organization will incur but a one-time cost in the collection of a datum.

It is possible to begin the process by collecting only the most basic data, such as salaries, recruiting costs, training and employee benefits. On an as-needed basis one might include items such as employee appreciation, turnover costs, living expenses, costs of personnel evaluation, incentive plans, travel and retirement benefits.

These measures can be grouped as needed in relationship to the specific program objectives. The problem, of course, is that often we want measures which may not be available in monetary form. Flamholtz [1974] feels that a useful procedure is to then look for what he calls "surrogate measures."

It is difficult, for example, to put a monetary value on "experience" of an officer-in-charge of a security group detachment. One might look to the communication business arena and determine the salaries being offered

managers of similar experience and responsibilities and subtract from this amount the wage of a manager trainee to get a substitute or "surrogate measure" of that elusive value we call "experience."

Surrogate measures are used only when direct measures are impossible. How would one compute the cost of replacing a pilot who would be willing to fly an A-6 some six hundred miles into enemy territory at an altitude of less than fifty feet through a mountain range? One might, however, be able to ascertain what wage incentives the CIA must employ to motivate their pilots to perform feats of similar risk. At best these are rough estimates. However, they are usually more effective in their use than to simply ignore their presence.

3. Actual Employment of the System in the Organization

Flamholtz and others at the University of Michigan found that it was best to begin with but one department or division of an organization to initiate this system. It is hoped that the particular department or division would be one of low visibility so that the anxiety levels of those who resist any organizational change would not be aroused.

McGuire [1974] found that in the act of collecting the required data an organization frequently sharpens its objectives in the process. For the first time some managers are forced to look directly at the kinds and quality of information they use in making decisions.

It has been found that once a department can show a rational basis for its human resource accounting that peers will take an active interest in applying it to their departments. Care must be taken, however, to note changes in the environment as the process continues. These measures are often very time sensitive. Care should be taken to allow for changes in the economy especially when comparing one department with another in computing ROI of its human resources.

II. THE HUMAN RESOURCE ACCOUNTING MODEL

Eric Flamholtz, of UCLA, sums up his work in human resource accounting as "the accounting for people as an organizational resource" [Flamholtz, 1974].[1] Naturally, this requires measuring costs associated with these human assets and measuring the economic value of these assets. The "bottom line" of the entire enterprise is to assist management in planning and controlling the use of these assets, to give a measure of how effectively and efficiently this is being accomplished.

A. THE NEED FOR DISTINCTIONS

As in any field of accounting, there are a number of distinctions to be made. Flamholtz shows how the organization will want to distinquish between orignial and replacement cost for its people [Flamholtz, 1974].[2] Similarly, there should be a distinction between outlay and opportunity costs (the former representing the cost of acquiring or replacing a person, and the latter representing the lost opportunities of productivity while

---

[1] Flamholtz, E., Human Resource Accounting, Dickenson Publishing Company, p. 3, 1974.

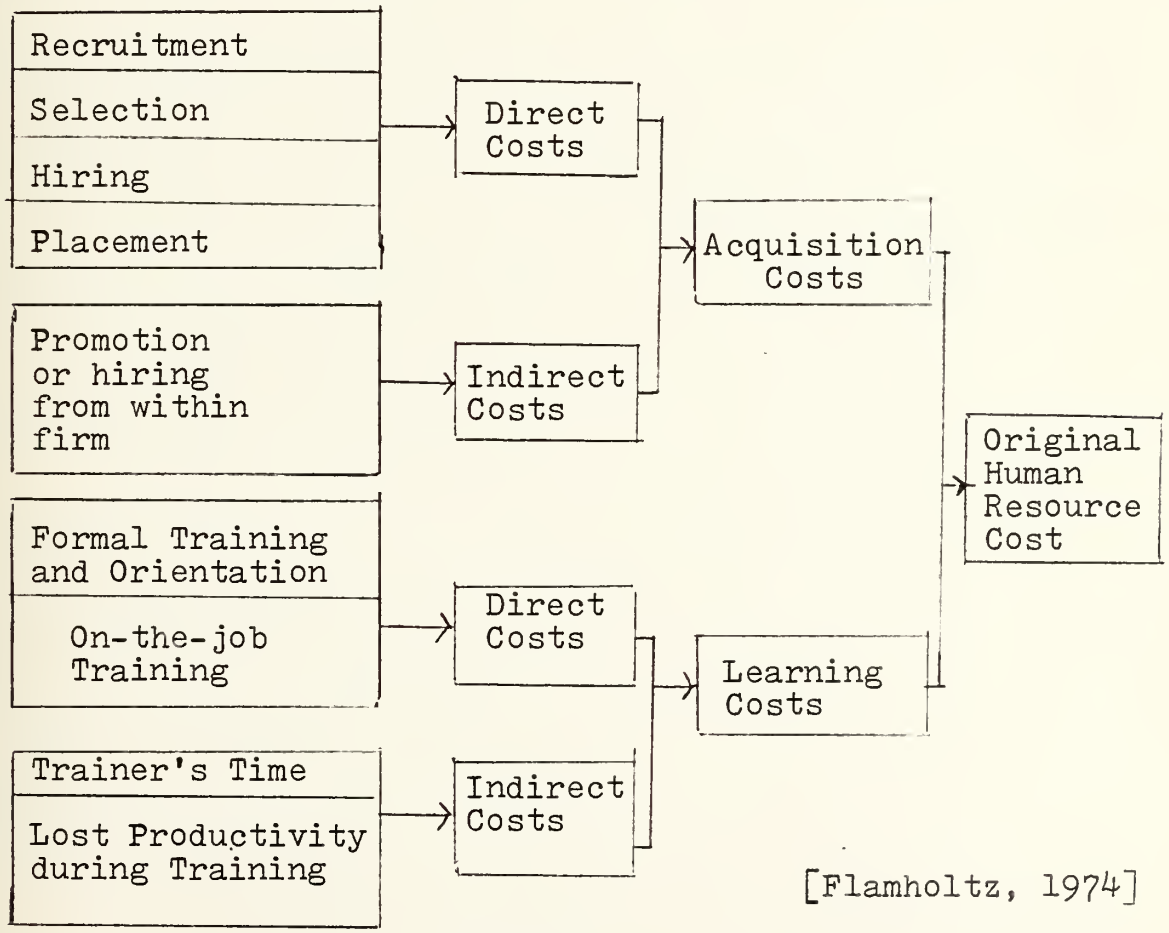
[2] Ibid., p. 34.

training or "breaking in" the replacement). One must also distinquish between direct and indirect costs, e.g. the salary of a seaman apprentice and the salary of his leading petty officer who is "breaking him in" to life at sea. Actual costs are best distinquished from standard costs (what costs actually are vice what they should be).

B. MEASURING HUMAN RESOURCES

Eric Flamholtz created a model for measuring original human resource costs. This model is shown in Figure 1.

Model For Measurement of Original Human Resource Costs



[Flamholtz, 1974]

FIGURE 1

This is useful in better understanding what an organization has actually invested in an individual. There are, however, additional costs in replacing that individual as may be seen in Figure 2.

Model For Measurement Of Human Resource Replacement Costs

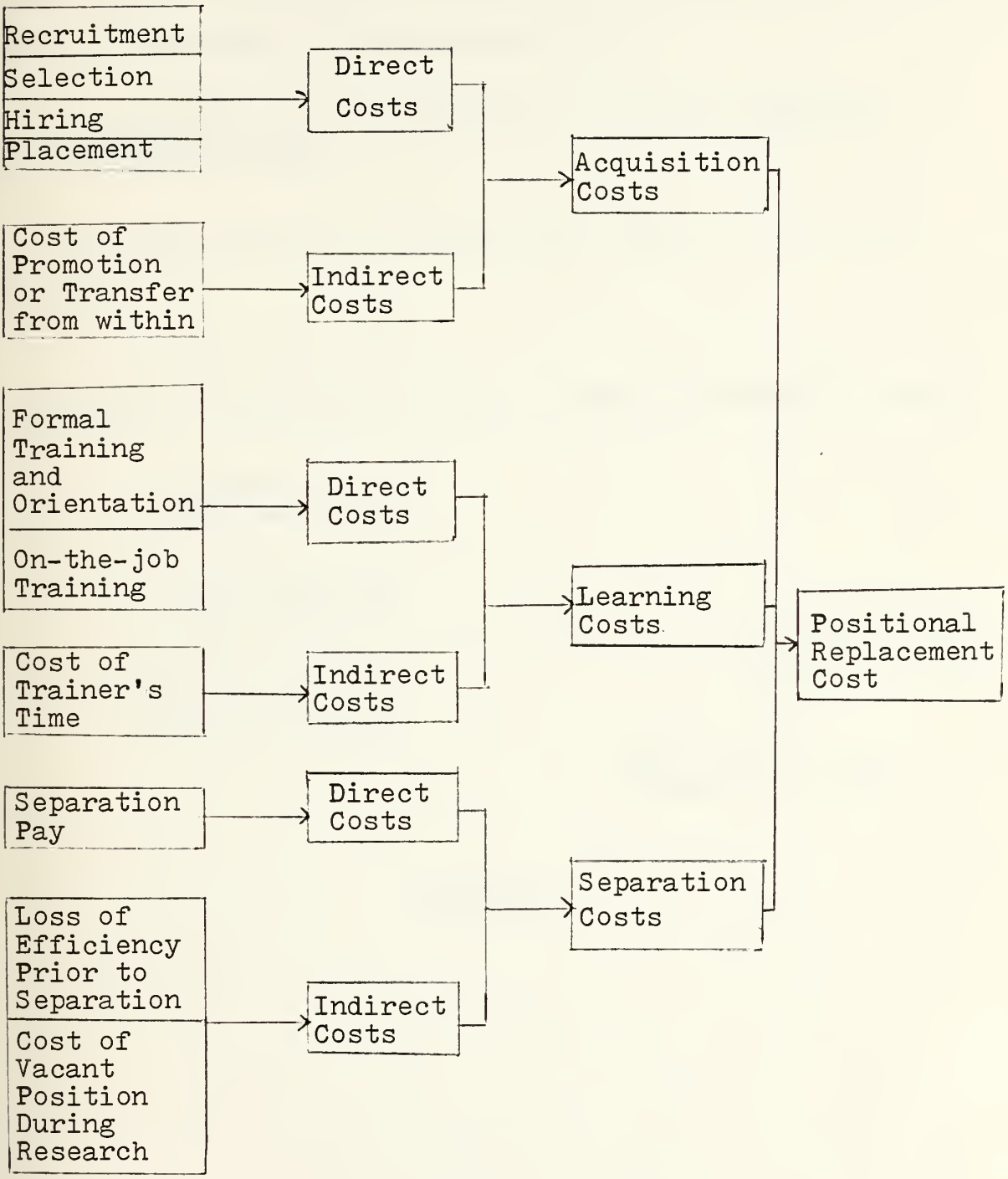


FIGURE 2

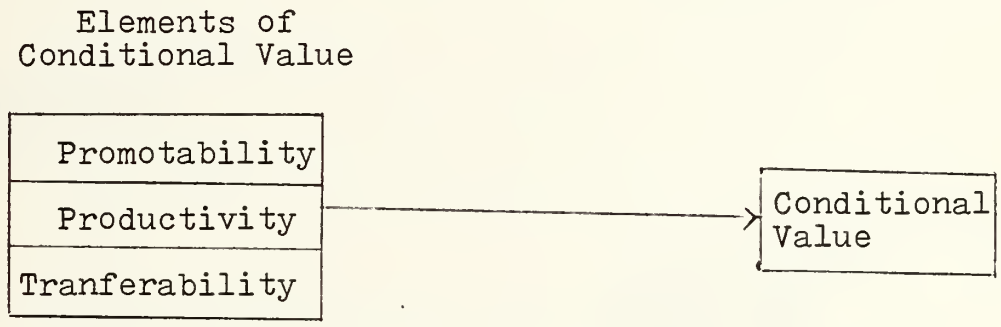
[Flamholtz, 1974]

It has been noted in a variety of ways that unlike geometry a human organization does not always equal the sum of its parts. A similar observation can be made with individuals comparing their expected and their conditional or possible value to the organization.

C. DIFFERENCE BETWEEN CONDITIONAL VALUE AND EXPECTED REALIZABLE VALUE

The basic concept of conditional value is illustrated in Figure 3.

Elements of Conditional Value and Their Interrelationships



[Flamholtz, 1974].

FIGURE 3

It is not suggested that the elements of conditional value are limited to these variables. In Chapter III it will be proposed that in Navy applications we shall want to include availability.

The important distinction here is in noting how conditional (potential) human value is different than expected realizable value.

Variables Interacting To Produce An Individual's Expected Realizable Value

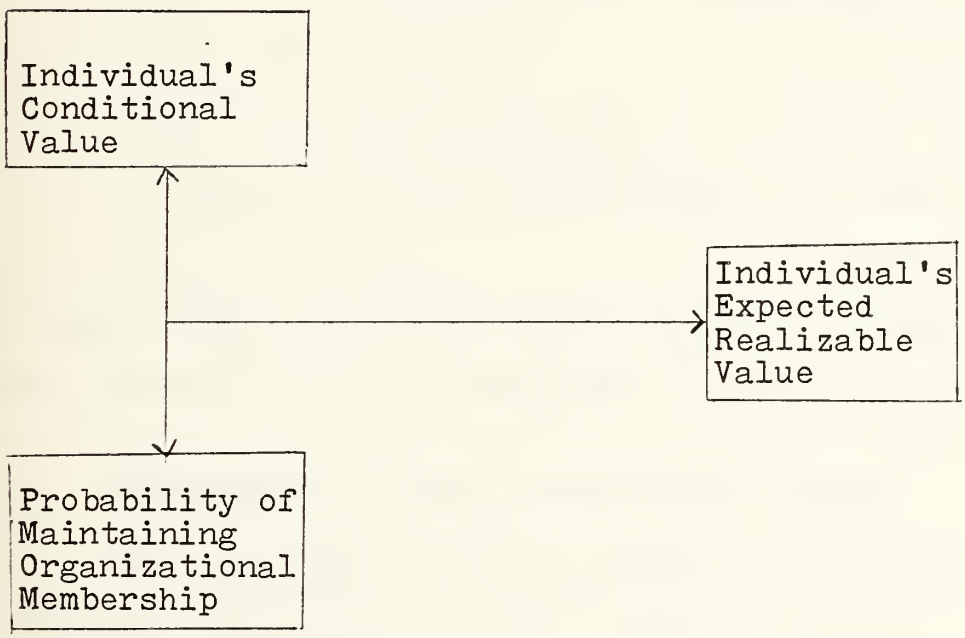


FIGURE 4

[Flamholtz, 1974]

1. Measurement of Conditional Value

Flow diagrams may assist managers. However, it is often necessary to compute these values in monetary terms.

Another manner of symbolizing these relationships is to define a person's expected conditional value as:[3]

$$E(CV) = \sum_{t=1}^{n} \frac{\sum_{i=1}^{m-1} R_i \, P(R_i)}{(1+r)^t}$$

where $E(CV)$ = expected conditional value

R_i = the value to be derived by the organization in each possible service state, i

$P(R_i)$ = the probability that the organization will derive R_i (the probability that a person will occupy state i)

t = time

m = the exit state

$(1+r)^t$ = the discount effect for money

[Flamholtz, 1974]

The conditional or potential value will frequently be used as the denominator in our management effectiveness ratio.

2. Measurement of Expected Realizable Value

The exit state (m) is included in the computation of expected realizable value[4] as follows:

$$E(RV) = \sum_{t=1}^{n} \frac{\sum_{i=1}^{m} R \cdot P(R_i)}{(1+r)^t}$$

---

[3] Flamholtz, op. cit., p. 170.

[4] Loc. cit.

This expected realizable value will frequently appear in the numerator in our management effectiveness ratio.

These models are based upon the notion that an individual generates value for an organization as the individual develops through a series of roles and job states tempered by such factors as failing promotion or early retirement. The movement of people from one role to another over a specified period of time is a probabilistic process depending upon the prior states of the system. The Stochastic Process Model includes the probability of an individual moving through these role states.

For an organization to use the model it is first necessary to:

a. define the mutually exclusive set of service states an individual may occupy in the system;
b. determine the value of each service state to the system;
c. estimate an individual's expected tenure in the valuation period;
d. establish the probability of an individual being able to transit these role states at specified future times.

3. Surrogate Measures

It is obviously will be necessary to refine this general model to meet specific Navy management needs. Flamholtz points out that monetary measures are not often available in service organizations. Surrogate measures can, however, sometimes be drawn by first taking an inventory of skills and competencies.

In this instance we might arrange a table:

	Operates Pump	Qualified in Damage Control	Small Boat Handler	Qualified Sound Power Phones	Total
Sn Jones		X	X	X	3
Sn Smith	X	X	X	X	4
Sn Black		X			1

Coefficients reflecting these hierarchies of competencies can then be applied to the computation of expected realizable value.

Still more precision can be obtained by attaching hourly wage amounts to these activities and sampling within a service state to compute the individual's worth to that organization based upon the work he is actually performing.

In the following chapter several applications of the model are attempted.

III. APPLICATION OF THE HUMAN RESOURCE ACCOUNTING MODEL

The already established objective of human resource accounting is accounting for people as an organizational resource. It is intended in this chapter to illustrate how the human resource accounting model may assist management in appreciating this resource more fully and distinctly.

Five management applications are proposed:

(a) Determining personnel measures of value to the organization so that return on investment (ROI) can be ascertained.

(b) Critique of a personnel promotion policy ("up or out").

(c) Appreciation of manpower costs associated with material cost overruns to effect overall savings.

(d) Adjustment of billets for a unit with fluctuating productivity.

(e) Achievement of more cost effective placement by Navy Detailers.

These applications, naturally, are not intended to represent the entire spectrum of personnel management. It is intended that they be timely and relevant to the management of human resources. All deals with return on investments. The first concentrates upon assessing human value.

A. DEVELOPING PERSONNEL MEASURES OF VALUE TO AN ORGANIZATION SO THAT RETURN ON INVESTMENT (ROI) CAN BE ASCERTAINED

Increasing interest is being expressed in productivity. The manager, however, is especially interested in productivity in relation to investment. And how can one begin to assess investment in human assets?

The example taken for this application is the Aviation Safety Program at Monterey, California. If one wants to ascertain return on investment one needs both measures of productivity and measures of investment. For the latter it is desirable not only to compute the conditional or potential value of these human resources but to compute the expected realizable value to the organization. Interviews were used to collect the following data:

1. Conditional Value

Applying the data to the conditional value model yielded the following results.

a. Military Instructors

(1) Director

Service States	Expected Service State Values	Probabilities of Occupying Each State	Product
04	25,312	0	0
05	30,118	0	0
06	36,176	1.0	36,176
			$36,176 per year

(2) Instructor/Admin

Service States	Expected Service State Values	Probabilities of Occupying Each State	Product
04	25,312	0	0
05	30,118	1.0	30,118
06	36,176	0	0
			$30,118 per year

(3) Instructor "A"

Service States	Expected Service State Values	Probabilities of Occupying Each State	Product
04	25,312	0	0
05	30,118	.8	24,094
06	36,176	.2	7,235.20
			$31,329.20 per year

(4) Instructor "B"

Service States	Expected Service State Values	Probabilities of Occupying Each State	Product
04	25,312	1.0	25,312
05	30,118	0	0
06	36,176	0	0
			$25,312 per year

(5) Instructor "C"

Service States	Expected Service State Values	Probabilities of Occupying Each State	Product
04	25,312	.07	1,744.47
05	30,118	.36	10,751.76
06	36,176	.57	19,953.99
			$32,450.22 per year

b. Civilian Instructors

(1) Prof

Service States	Expected Service State Values	Probabilities of Occupying Each State	Product
Asst Prof	28,000	0	0
Assoc Prof	33,000	0	0
Prof	36,000	1.0	36,000
			$36,000 per year

(2) Assoc Prof

Service States	Expected Service State Values	Probabilities of Occupying Each State	Product
Asst Prof	28,000	0	0
Assoc Prof	33,000	1.0	33,000
Prof	36,000	0	0
			$33,000 per year

(3) Asst Prof

Service States	Expected Service State Values	Probabilities of Occupying Each State	Product
Asst Prof	28,000	1.0	28,000
Assoc Prof	33,000	0	0
Prof	36,000	0	0
			$28,000 per year

c. Civilian Secretaries

(1) Clerk/typ "A"

Service States	Expected Service State Values	Probabilities of Occupying Each State	Product
GS-3	7,900	0	0
GS-4	10,800	.2	2,160
GS-5	11,400	.8	9,120
			$11,280 per year

(2) Clerk/typ "B"

Service States	Expected Service State Values	Probabilities of Occupying Each State	Product
GS-3	7,900	1.0	7,900
GS-4	10,800	0	0
GS-5	11,400	0	0
			$7,900 per year

The total conditional value of this staff comes to $271,564.42 for the current fiscal year.

2. Expected Realizable Value

Data collected to compute expected realizable value included:

SERVICE STATE (PAYGRADE)	POSITION	MARKET VALUE	YEARS OF REMAINING SERVICE
06	DIRECTOR	$36,176	5
05	INSTRUCTOR/ADMIN	30,118	4
05	INSTRUCTOR "A"	30,118	5
04	INSTRUCTOR "B"	25,312	4
04	INSTRUCTOR "C"	24,921	14
	PROF	36,000	27
	ASSOC PROF	33,000	1
	ASST PROF	28,000	7
GS-4	CLERK/TYP "A"	10,800	5
GS-3	CLERK/TYP "B"	7,900	1

This is broken down as follows:

a. Military Instructors

(1) Director

Service States	Expected Service State Values	Probabilities of Occupying Each State	Product
04	25,312	0	0
05	30,118	0	0
06	36,176	.9	32,558.40
exit	0	.1	0
		Total	$32,558.40 per year

(2) Instructor Admin

Service States	Expected Service State Values	Probabilities of Occupying Each State	Product
04	25,312	0	0
05	30,118	.9	27,106.20
06	36,176	0	0
exit	0	.1	0
		Total	$27,106.20 per year

(3) Instructor "A"

Service States	Expected Service State Values	Probabilities of Occupying Each State	Product
04	25,312	0	0
05	30,118	.75	22,588.50
06	36,176	.15	5,426.40
exit	0	.1	0
		Total	$28,014.90 per year

(4) Instructor "B"

Service States	Expected Service State Values	Probabilities of Occupying Each State	Product
04	25,312	.9	22,780.80
05	29,866	0	0
06	35,007	0	0
exit	0	.1	0
		Total	$22,780.80 per year

(5) Instructor "C"

Service States	Expected Service State Values	Probabilities of Occupying Each State	Product
04	24,921	.06	1495.26
05	29,866	.32	9557.12
06	35,007	.52	18203.64
exit	0	.1	0
		Total	$29,256.02 per year

b. Civilian Instructors

(1) Prof

Service States	Expected Service State Values	Probabilities of Occupying Each State	Product
Asst Prof	28,000	0	0
Assoc Prof	33,000	0	0
Prof	36,000	.9	32,400
exit	0	.1	0
		Total	$32,400 per year

(2) Assoc Prof

Service States	Expected Service State Values	Probabilities of Occupying Each State	Product
Asst Prof	28,000	0	0
Asso Prof	33,000	.9	29,700
Prof	36,000	0	0
exit	0	.1	0
		Total	$29,700 per year

(3) Asst Prof

Service States	Expected Service State Values	Probabilities of Occupying Each State	Product
Asst Prof	28,000	.9	25,200
Assoc Prof	33,000	0	0
Prof	36,000	0	0
exit	0	.1	0
		Total	$25,200 per year

c. Civilian Secretaries

(1) Clerk/Typ "A"

Service States	Expected Service State Values	Probabilities of Occupying Each State	Product
GS-3	7,900	0	0
GS-4	10,800	.15	1620
GS-5	11,400	.75	8550
exit	0	.1	0
		Total	$10,170 per year

(2) Clerk/Typ "B"

Service States	Expected Service State Values	Probabilities of Occupying Each State	Product
GS-3	7,900	.9	7,110
GS-4	10,800	0	0
GS-5	11,400	0	0
exit	0	.1	0
		Total	$7,110 per year

The total expected realizable value is $244,269.22.

In this example we may now compare the two assessments:

POSITION	EXPECTED REALIZABLE VALUE	CONDITIONAL VALUE	CHANGE
DIRECTOR	$32,558.40	$36,176.00	$3,617.60
INSTRUCTOR/ADMIN	27,106.20	30,118.00	3,011.80
INSTRUCTOR "A"	28,014.90	31,329.20	3,314.30
INSTRUCTOR "B"	22,780.80	25,312.00	2,531.20
INSTRUCTOR "C"	29,256.02	32,450.22	3,194.20
PROF	32,400.00	36,000.00	3,600.00
ASSOC PROF	29,700.00	33,000.00	3,300.00
ASST PROF	25,200.00	28,000.00	2,800.00
CLERK/TYP "A"	10,170.00	11,280.00	1,110.00
CLERK/TYP "B"	7,110.00	7,900.00	790.00
TOTAL	$244,269.32	$271,565.42	$27,296.10

3. Return on Investment

One can now move on to calculating return on investment. Several sources contribute to aviation safety. Some of the major programs include:

a. Naval Air Training and Operating Procedures Standardization (NATOPS)

This program is a positive approach toward improving combat readiness and achieving a substantial reduction in the aircraft mishap rate. Standardization, based on professional knowledge and experience, provide the basis for development of sound and efficient operating procedures. The NATOPS general flight and operating instructions provides policy and procedural guidance applicable to a broad spectrum of users. A NATOPS manual is adapted for each aircraft type and contains complete and indepth information about that aircraft type.

b. Naval Aviation Maintenance Program (NAMP)

This program promulgates the maintenance policies, procedures, and responsibilities for the conduct of the NAMP at every level of maintenance throughout naval aviation. It outlines command, administrative, and management relationships, and establishes policies for the assignment of maintenance tasks and/or responsibilities for the conduct of the NAMP.

c. Naval Safety Center

The mission of this center is to collect and evaluate information pertaining to safety, publish statistical data

concerning accidents, maintain a repository for accident and safety reports, maintain direct liaison with all levels of command within the Navy and other government and private agencies engaged in safety work and other aspects of the Department of the Navy Safety Program in order to advise and assist the CNO in promoting and monitoring safety and the prevention of accidents; initiate and conduct informal investigations into all phases of safety to develop information to make recommendations for the formulation of safety policy necessary to maintain the highest practical level of combat readiness.

d. Aviation Safety Program at the Naval Postgraduate School

This particular program at the Naval Postgraduate School trains qualified safety officers who are assigned to aircraft squadrons. These officers are provided with specialized safety training and education as required to support the overall Navy Safety Program.

The budget for the Aviation Safety Program at the Naval Postgraduate School is $329,645, of this $262,945 goes to salaries leaving a balance of $67,000 for operating expenses.

In order to use the Stochastic Rewards Valuation Model, an arbitrary figure of 10% was used regarding the Naval Postgraduate School's Aviation Safety Program's contribution to the dollars saved per year in the reduction of major aviation accidents. The following figures did not reflect aircraft losses or accidents that are combat related.

	1959	1967	1975
Major Accident Rate	2.57	1.37	.74
Number of Air-Craft Destroyed	461	314	116
Average Cost Per Aircraft Accident	347,000	782,000	1,900,000
Aggregate Cost of Aircraft Accidents	311 million	399 million	294 million

Between the years 1971 and 1975 the aggregate cost of aircraft accidents dropped from $359 million to $294 million or $16,250,000 per year. When it is said that the Naval Postgraduate School's Safety Program had a 10% effect on aggregate savings of aircraft accident dollars, then alledgedly, $1,625,000 was saved by this safety program each year. These figures did not reflect pilot injuries or losses.

The return on investment then can be demonstrated as:

$$\frac{\$1,625,000}{\$244,269} \text{ or } 6.65$$

If one wanted to assess the overall worth of the Aviation Safety Program at Monterey, California in relation to the other contributors of aviation safety, one would , of course, have to compute the expected realizable value of those human resources involved.

B. CRITIQUE OF CURRENT PROMOTIONAL POLICY ("UP OR OUT")

The current "up or out" promotion policy of the Navy influences the early release from active duty of

non-promotable lieutenants and lieutenant commanders. At present a senior manager has little information on just how much this policy saves or costs the Navy.

By using the Stochastic Rewards Valuation Model, it is possible to assess the conditional and expected realizable values of promotable and non-promotable aviation warfare lieutenant commanders. In this fiscal year it turn out to be $32,450.22 and $25,312.00 respectively.

If we used this information in staffing an hypothetical aviation training facility (Base Alpha) which requires eleven lieutenant commander flight instructors we would learn that staffing these billets with promotable officers would mean an investment of $356,952.42. Using non-promotable officers would cost $278,432.00.

As the current policy of "up or out" continues it may be argued that in just one isolated case the Navy is forfeiting $78,520 per year. It is felt that this measure is more precise than simply using replacement cost of flight instructors.

This example could be extended to illustrate conditional value in combat versus expected realizable value in garrison. Policy makers are apparently not including such parameters in their current diliberations.

C. THE PREDICTION OF HUMAN ASSET COSTS ASSOCIATED WITH NEW CONSTRUCTION COST OVERRUNS

Let us assume that a new "Tribute" submarine is being constructed at Gulfport, Mississippi with an average

material cost overrun of $5,200,000 per copy. Let us also assume that with each occurrence of cost overrun ther is a ninety day delay due to charges and countercharges between the shipyard and the Navy project managers and the Congress.

Wise personnel management would have designed training, detailing and replacement pipelines to coincide with the pre-commissioning and commissioning details for these submarines. What effect will these ninety day delays have upon these personnel pipelines?

A human resource accounting balance sheet would hopefully include acquisition costs, training costs and replacement costs of the human assets.

Let us assume that there are fifteen officers and ninety enlisted men assigned to each vessel. The conditional value of these assets would include salaries (market value), transferability, promotability and productivity. The expected realizable value would have to include factors which would more accurately reflect additional training, acquisition and earlier replacement costs along with shortened tenure with the total organization.

Rough computation of conditional value might be as follows:

Market value for officer compliment (3 months)	$135,000
Market value for enlisted compliment (3 months)	540,000
Officer Acquisition costs (screening, detailing)	75,000
Enlisted Acquisition costs	450,000
Officer Training costs (amortized for three year tour)	135,000
Enlisted Training Costs	540,000
	$1,875,000

Expected Realizable Value might well include the following:

Market value of extended tour for officer (3 months)	$33,750
Market value of extended tour for enlisted	45,000
Additional Training costs for officer replacements	(-11,250)
Additional Training costs for enlisted replacements	(-45,000)
Additional Officer acquisition costs	(- 6,250)
Additional Enlisted acquisition costs	(-37,500)
Replacement costs for officer compliment (amortized)	(- 5,000)
Replacement costs for enlisted compliment (amortized)	(-22,500)
Exit costs for officers	(- 6,750)
Exit costs for enlisted	(-27,000)
Total Realizable Value of this crew (3 months)	(-82,500)
Personnel Costs associated with delay =	$1,957,500

As a senior manager, knowing that a 5.2 million dollar override incurs a three month delay in construction and an attendant loss of nearly 2 million dollars in personnel assets, one may want to negotiate toward a faster settlement and to compute the date beyond which it is counter-productive to fight the override.

It might also motivate the senior manager to invest further human assets in the form of a task force to

facilitate communication between the shipyard, Navy project managers and the Congress. For purposes of discussion, suppose that the following officers are detailed at their present service state values:

Captain (06)	$36,176.00
Commander (05)	31,329.20
Lieutenant Commander "A"	25,312.00
Lieutenant Commander "B"	32,450.00
Lieutenant Commander "C"	25,312.00
Lieutenant	19,971.00
Task Force Conditional Value	$170,550.42 per year

Correcting this amount for expected realizable value, one might come up with $148,000 as an investment cost. Further suppose that these officers as a facilitating team could effect a 20% savings in the cost overrun problem. The return on investment would be:

$$\frac{\$1{,}040{,}000 \quad \text{(dollars saved in one year)}}{\$ \quad 148{,}000 \quad \text{(expected realizable value of team)}} = \$7.02$$

or, for every dollar invested, a return of $7.02.

D. ESTIMATION OF PERSONNEL COSTS ASSOCIATED WITH ADJUSTING THE OPERATIONAL MISSION OF A NAVY ORGANIZATION

The operational missions assigned to organizations are dynamic in nature. Their importance varies over time. The ability to support these operational missions also varies in relation to material and human assets available.

Suppose that Station Delta is a storm tracking station located in Florida. It is presently staffed with a lieutenant commander and four lieutenants. The use of surrogate

measures gives a productivity figure of $1,200,000 for the unit in the last fiscal year. This year, however, because of the Defense Department's decision to shift part of their mission to an Air Force satellite system, the value of their output is to be reduced by $300,000.

The management question to be answered is how far--if at all--can the staff be reduced and maintain present productivity? To answer this question one needs to first ascertain the expected realizable value of the present staff and to project the productivity ratio expected with a denigration of the assigned mission.

The following data may be applied:

1. Expected Conditional Value

Service States	Expected Service State Values	Conditional Probabilities of Occupying Each State	Product
Officer in Charge	25,400	1.00	25,400
Deputy Officer in Charge	21,300	.85	18,105
Staff Officer	20,500	.56	11,480
Staff Officer	20,500	.35	6,765
Staff Officer	20,500	.11	2,255
		Expected Conditional Value	$64,005

2. Expected Realizable Value

Service State	Expected Service State Value	Realizable Probabilities Of Occupying Each State In this Unit	Transferability Of Expertise To Other Assignment	Product
Officer in Charge	25,400	1.00	.75	19,050
Deputy Officer in Charge	21,300	1.00	.70	15,491
Staff Officer	20,500	.50	.50	5,125
Staff Officer	20,500	.20	.30	1,230
Staff Officer	20,500	.00	.10	0
			Expected Realizable Value	$40,896

In this factitious example the very act of computing human resource values may open the vision of a senior manager to appreciate more alternatives than he had at first supposed.

At first blush the senior manager may feel that his return on investment at present is:

$$\frac{\$1,200,000}{\$\ 64,005} \quad \text{or } \$18.75$$

In actuality it is $29.34.

$$\frac{\$1,200,000}{\$\ 40,896} = \$29.34$$

Cutting one staff billet which was not actually productive in the first place would reduce productivity this fiscal year to $22.00,

$$\frac{\$900,000}{\$\ 40,896} = \$22.00$$

still, ahead of his perceived productivity for the previous year.

It is anticipated that in most cases the senior manager will experience some internal changes in his perception of his human assets. However, human resource accounting may also lead him to see new options which include the excising of "dead wood."

E. EVALUATION OF DETAILING AND ASSIGNMENT PROCEDURES

It was stated earlier that the "bottom line" objective of Human Resource Accounting was to improve the management of human resources. One measure of such efficient management is to look at the ratio of conditional value to expected realizable value:

$$\frac{\text{Expected Realizable Value}}{\text{Conditional (Potential) Value}}$$

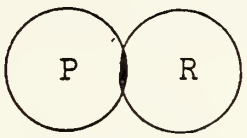
The closer this ratio comes to 1.0 the closer it is to maximum effectiveness. Students of management in future years may be able to demonstrate the effects of synergy where they can predict efficiencies of 1.5 or 3.5.

Presumably, however, even at this present date, one could evaluate the effectiveness of detailers and assignment officers by looking at their matching of conditional and expected realizable value. The premise of this approach is to seek the best possible fit of person and billet (and not to settle for the first available and qualified body).

Suppose that there is an opening for exchange duty at the Royal Navy Staff College in London where the principal

subject of study will be naval use of the Harrier aircraft. The detailers have made available three lieutenant commanders. It is up to the assignment officer to select the best.

The best candidate will likely have the maximum possible overlap between the person and role:



But the best choice might also be influenced by such factors as:

a. separation costs incurred by previous command
b. availability
c. transferability of expertise to new job
d. likelihood to complete tour
e. associated costs such as size of family and travel requirements.

Suppose that the three nominees have profiles as shown in Figure 5.

Qualification Profiles of Three Candidates

	LCDR A	LCDR B	LCDR C
Present location of nominee	NFK, Va	SD, Ca	JAX, Fl
Months left at present location	14	3	18
Aircraft qualified	helicopter (.2)	F-4 (.8)	P-3
Previous months teaching experience	10	24	0
Previous assignments overseas	0	1	0
Size of family	W, 2c	W, 3c	s
Likelihood to complete tour	.60	.90	.75
Previous staff experience	6 mo	24 mo	0
Likelihood of promotion	.85	.85	.85
Likelihood of exit	.10	.00	.10

FIGURE 5

The conditional value of all three officers (Figure 5) will not be constant due to the predicted probabilities of remaining in that service state (A=.6, B=.9, C=.75).

$$E(CV) = \sum_{t=1}^{n} \left[\frac{\sum^{m-1} R_i \cdot P(R_i)}{(1+r)^t} \right]$$

where E(CV) = expected conditional value

Thus starting with the expected service state value of each officer at $25,312 we find that:

ECV of LCDR "A" = 15,187.20
"B" = 22,780.80
"C" = 18,984.00

The expected realizable value will include the expected service state value but will be tempered by the remaining variables some of which are in ordinal form and one of which is normative in form. To circumscribe this difficulty we will ask a panel to assign coefficients of importance and to rank order these variable on interval scales.

Table 1 Breakdown of Costs

	Coefficient of Importance (1)	Rank order of Candidates (2)			Product		
		A	B	C	A	B	C
a. separation costs	.6	1	3	2	.6	1.8	1.2
b. availability	1.0	2	1	3	2	1	3
c. transferability	1.0	2	1	3	2	1	3
d. Prob of completion	1.0	2	1	3	2	1	3
e. associated costs	.6	2	3	1	1.2	1.8	.6
rank order of costs					7.8	6.6	10.8
converting to % (x 100) of possible costs					.078	.066	.108

In this example one should add to the model proposed by Eric Flamholtz to compute expected Realizable value by subtracting a quantity representative of the attendant costs to the organization by employing that individual, E (CV)·A

$$E(RV) = \sum_{t=1}^{n} \left[\frac{\sum^{m} R_i \quad P(R_i)}{(1+r)^t} \right] - E(CV) \cdot A$$

thus the expected realizable value of the nominees is:

LCDR A 15,187.20 - 1184.6 = 14002.60 ÷ ECV (15,187.2) = .922
LCDR B 22,780.80 - 1503.53= 21277.27 ÷ ECV (22,780.8) = .934
LCDR C 18,984.00 - 2050.27= 16,933.73 ÷ ECV (18,984.0)= .892

If the assignment officer looked only at the size of family and the distance to be traveled, he would likely have chosen LCDR "C", LCDR "A" and "CDR "B" in that order--the opposite of the most effective fit. A running evaluation of the assignments might be used as a training and motivating mechanism for assignment officers to modify their performance and rearrange their view of the significant assignment variables.

These examples are offered only as representative of a variety of management decisions in which human resource accounting might be employed to improve the management of human resources. It is not intended that these examples be exhaustive of the model's use. It is felt, moreover, that in the very act of using the model managers will both increase their appreciation of their human assets and look to them much more carefully for management alternatives.

IV. CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE STUDY

A. CONCLUSIONS AND OBSERVATIONS

The concept of human resource accounting has been developed in order to improve the effectiveness of managerial decision-making. Assessments of human resources should assist in recognizing and defining problems. Trends in the rate of change in the ratio of investments in human assets to total assets may be a useful predictor of future profit performance. There is some evidence to indicate a degree of correlation between profitability of organizations and their expenditures on acquisition, training, and retention of human resources. This suggests that organizations with a higher human asset investment ratio will ultimately outperform other organizations in the same field.

Traditional balance sheets and income statements tend to distort the reality of the organization's past performance and current status because of the absence of an estimate of the value of the human assets. The human resource is usually looked upon as a liability. The present worth of each individual should be computed and added to the asset side of the balance sheet. This realistic and positive approach has the potential to foster awareness and increase cooperation and productivity throughout the organization.

B. UNRESOLVED PROBLEMS

Since there is no unifying framework of human resource accounting, the management of human resources in organizations varies from organization to organization. The concept of Human Resource Accounting is still in the model building and testing stage. Since formal models are largely non-existant, it is impossible to define precisely the role of human capital in decision making [Lev and Schwartz, 1972].

Another major limitation is that the organization's value of human resources does not equal the contributions to profit contributed by the human resources. In many capital intensive organizations this ratio may be unrealistic. It is felt that still more inclusive accounting for human assets must be found.

There are five basic classes of issues which have not yet been resolved fully in human resource accounting: (1) the question of its utility to management and investors or Navy sponsors, (2) the development of measurement methods, (3) the development of operational systems in organizations, (4) the organizational impact of human resource accounting, and (5) the appropriateness and methods of reporting human assets to external users of corporate financial accounting information [Flamholtz, 1974].

C. RECOMMENDATIONS FOR FUTURE STUDY

Although many companies have developed and implemented human resource accounting systems, future research is still required. In principle, human resource valuation is appropriate for any individual in any specified organization. It is appropriate not only in profit oriented enterprises but also in non-profit oriented organizations, including government and universities [Flamholtz, 1971]. Many insights to facilitate future programs can be gained by critical evaluation of theory and methods proposed to measure human resource value [Flamholtz, 1972].

Recommended areas for future study include: (1) the use of human resource accounting as an actual organizational development intervention in which a Heisenberg effect is expected by the very use of the model; (2) effects resulting from the inclusion of investment in human assets information in financial statements for external users; (3) effects on decision making by management when human resource accounting data is available; (4) the use of human resource accounting data in setting up employment benefits and compensations; and (5) what will be the overall effect on our society when people come to consider other people as resources.

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